

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE J		PAGE OF PAGES 1 2	
2. AMENDMENT/MODIFICATION NO. 0002		3. EFFECTIVE DATE 04-Jun-2003		4. REQUISITION/PURCHASE REQ. NO. W68MD9-3028-6345		5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, SEATTLE ATTN: CENWS-CT P.O. BOX 3755 SEATTLE WA 98124-3755		CODE DACA67		7. ADMINISTERED BY (If other than item 6) See Item 6			
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/> X		9A. AMENDMENT OF SOLICITATION NO. DACA67-03-R-0213	
				<input checked="" type="checkbox"/> X		9B. DATED (SEE ITEM 11) 13-May-2003	
						10A. MOD. OF CONTRACT/ORDER NO.	
						10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input checked="" type="checkbox"/> X The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> X is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>0</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Family Housing, Phase 3 Malmstrom AFB, Montana Provide the minutes of the site visit held on May 29, 2003.							
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				TEL: _____ EMAIL: _____			
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED 04-Jun-2003	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

The following items are applicable to this modification:CONT. SHEET BLOCK 14**A. This amendment is issued to provide the following information:**

1. The minutes for the site visit meeting are provided for information only and do not become part of any contract resulting from this solicitation.
2. Replace Section 02721, Sub-base Courses
3. Replace Section 02722, Aggregate Base Course
4. Replace Section 02731, Aggregate Surface Course
5. Replace Section 02741, Hot-Mix Asphalt (HMA)

B. The revised attached pages supersede pages of the same number and should be inserted in numerical sequence. All changes are generally identified, for your convenience, either by strikeout for deletions, and underlining of text for additions or single dark line in the margin. All portions of the revised or new pages shall apply to this contract whether or not changes have been indicated.

C. THE PROPOSAL DUE DATE AND TIME HAS NOT BEEN CHANGED, 2:00 PM (PDT), June 10, 2003.

D. NOTICE TO OFFERORS: Offerors must acknowledge receipt of this amendment by number and date on Standard Form 1442, BACK, Block 19, or by telegram.

E. All Technical Amendments are available for download this date on the Army Corps of Engineers website at <http://www.nws.usace.army.mil/ct/>.

Enclosures

Minutes of Site Visit Meeting

Section 02721, Sub-base Courses

Section 02722 Aggregate Base Course

Section 02731 Aggregate Surface Course

Section 02741, Hot-Mix Asphalt (HMA)

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REPLACE FAMILY HOUSING
PHASE 3
MALMSTROM AFB, MONTANA

PRE-PROPOSAL SITE VISIT & CONFERENCE

MAY 29, 2003
GREAT FALLS, MONTANA

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1 right, thanks.

2 PRESENTATION

3 9:40 a.m.

4 MR. NAKAMOTO: While Tom's getting ready, I'll
5 welcome you to Malmstrom. This housing is the second in a
6 series of three that we're going to be doing. There are
7 others coming up, too.

8 I just want to say that the project is due
9 June 11th, 2:00 p.m., and I'd like to say again, also,
10 that we are going to -- oh, I'm sorry, did I ask you if
11 you were ready? Sorry. I should have asked you if you
12 were ready.

13 We're going to have an amendment coming out as
14 soon as we conclude this proceeding, probably by Monday.
15 If not, about three days.

16 So I'm Jim Nakamoto. I'm the Seattle base
17 manager with the Corps of Engineers. I'm going to ask
18 everyone to introduce themselves, along with filling out
19 the attendance roster, and I would like to start with you,
20 sir. Go ahead and give your name, your affiliation, and
21 if you have a difficult spelling name, would you please
22 spell it out for our court reporter.

23 MR. FRANCETICH: Rob Francetich,
24 F-r-a-n-c-e-t-i-c-h. I'm with MCS Environmental for the
25 asbestos and lead work.

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1 INTRODUCTION

2 8:50 a.m.

3 MR. NAKAMOTO: Good Morning. My name is
4 Jim Nakamoto. I'm the Seattle base project manager for
5 Malmstrom Housing, and we're going to do the Replace
6 Family Housing today, Phase 3.

7 Phase 3 consists of about 24 total units. We're
8 going to do 16 base, and the rest of them, the 29 options
9 are -- because, you know, we have options for fencing and
10 we have options for constructing. Each one of those
11 houses is a separate option item.

12 What we're going to do today first is to go out
13 and visit the site and give you the lay of the land. You
14 can take photographs. Also that information is put on the
15 documents, and about three days afterwards we will do an
16 amendment to the contract proposal. They will be
17 distributed to everybody that's registered on the Techbid.
18 And we will also answer some tech questions that we've had
19 come in, so that everybody can see what that question and
20 answer would be.

21 Now, today, when we're on the site, we will take
22 no questions. If you have any, please write it down, and
23 we'll answer it at the presentation, when we get there.
24 And for the responses, we'll do it as an amendment, so
25 everybody has the same information together, okay? All

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1 MR. NAKAMOTO: And your title, sir?

2 MR. FRANCETICH: I'm the Montana industrial
3 hygiene manager.

4 MR. NAKAMOTO: Okay, sir.

5 MR. GAMBLE: Jack Gamble, base civil
6 engineering, project manager.

7 MR. KORSLIEN: Alan Korslien, K-o-r-s-l-i-e-n.
8 I'm the Corps of Engineers' project engineer, Malmstrom.

9 MR. OSWOOD: Nick Oswood, Oswood Construction
10 Company, O-s-w-o-o-d. I'm the project manager, and we're
11 a general contractor.

12 MR. WITHAM: Mark Witham, W-i-t-h-a-m, Liberty
13 Electric, project manager.

14 MR. LANE: Tri-County Mechanical, my name's Matt
15 Lane, project manager for plumbing.

16 MR. BODART: Tri-County Mechanical, John Bodart,
17 B-o-d-a-r-t, project manager, HV-AC.

18 MR. NIELSON: Chris Nielson, Evergreene
19 Construction -- Evergreene has an "E" on the end of it --
20 N-i-c-l-s-o-n. I'm bidding this as prime.

21 MR. NAKAMOTO: Let's see, sir?

22 MR. BLALOCK: Captain Jack Blalock, Chief of
23 Construction Management, B-l-a-l-o-c-k.

24 MR. BRUS: Terry Bruce, I'll be the Air Force's
25 hands-on inspector. Last name's B-r-u-s.

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1 MR. NAKAMOTO: Okay. Thank you very much.

2 MR. DeGONIA: I'm Tom DeGonia, D-e-G-o-n-i-a.

3 I'm the contract specialist for this.

4 I apologize for the delay.

5 MR. NAKAMOTO: Excuse me, Tom. What I was just
6 going to say was the transcript is going to be taken word
7 for word, but it's also a record of the proceedings today,
8 so if you have any questions, you can ask that question.
9 If -- if Tom determines that the question is best answered
10 in a written format, we will do that as soon as possible
11 and publish it with the amendment that will accompany the
12 transcript and any changes to the contract that we see
13 through bid or inquiries to the Techbid process.

14 So with that, I'll give it to Tom DeGonia, and
15 he will provide the presentation as to how we will do the
16 evaluation and what we're doing for the contract.

17 All right, Tom.

18 MR. DeGONIA: So everybody knows, I'm recording
19 it also, so that if there are any questions, I'll be able
20 to answer them immediately, not have to wait for this
21 lovely lady's transcript.

22 I'm Tom DeGonia. I'm the contract specialist
23 for this project. This is for the Malmstrom Air Force
24 Base, Montana, Pre -- Pre-proposal Site Visit &
25 Conference. There we go.

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1 First of all, I'd like to welcome you, and I
2 hope that we -- you've been able to pick up some things
3 from the visit -- or the site visit, rather. This is a
4 project that is a Request for Proposal, RFP, not an
5 Invitation to Bid.

6 This meeting, the minutes are being recorded by
7 a court reporter, and in turn they will become part of the
8 RFP. When I receive them, I'll cut an amendment to the
9 Solicitation, so that everybody will know what was
10 covered.

11 Comments and clarifications made today will not
12 change the Solicitation. For example, if you have a
13 question, anything that we discuss here will not have an
14 effect as far as changing the Solicitation. That has to
15 be submitted through Techbid, evaluated, and we'll make a
16 change from there. Changes to the Solicitation will only
17 be made through written amendments, as I just said.

18 Today's attendance list will also become part of
19 the Solicitation.

20 Questions During the Proposal Stage:
21 Contracting web address, you can submit them to me -- or
22 submit them to the address there, or you can go on to the
23 web there, see the Solicitation.

24 For any technical questions, you submit it
25 through Techbid. Calling me will only delay it. Sending

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1 the e-mail to me will only delay it. You submit all your
2 questions concerning the -- any ambiguities or req -- or
3 need for clarification, you submit them to Techbid.

4 I'll answer any administrative question that you
5 have. You can contact me either through the e-mail, or
6 you can call me at the number listed here. You also have
7 that on your handout that I gave you. I'm also at the web
8 site. You'll find my name and phone number there.

9 This project consists of constructing 24 units
10 and 12 duplex configured buildings. Eight units (four
11 buildings) will be options. The project will be -- will
12 demolish an equal number of units, including removal of
13 all basements. The concrete from the demolition shall be
14 moved to a base located recycle area. Full underground
15 utilities will be required. The housing components
16 consist of two-story design, with no basements. Features
17 are composite roof, insulated windows, carpeting, vinyl
18 tile, porcelain floor tile, single-car garage, landscaping
19 and patio fencing. Options include landscape sprinklers
20 and yard fencing.

21 Does anyone have any questions on that?

22 You will also find this same item in the RFP.

23 This project is a Request for Proposal, as I've
24 already said. It requires submission of a technical and
25 price proposal. Go to Section 00110 of the proposal.

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1 Read it very carefully, along with look at your clauses
2 that are in there.

3 That Section 00110 tells you exactly what you
4 have to submit. Don't read anything extra into it. Read
5 exactly what it says and do what it -- exactly what the
6 Solicitation says.

7 The technical and price proposals are required
8 to be submitted to the Corps by 2:00 p.m. Pacific Standard
9 Time, 10th of June.

10 MR. NAKAMOTO: Isn't it the 11th?

11 MR. DeGONIA: No, it's the 10th.

12 MR. NAKAMOTO: It's the 10th now?

13 MR. DeGONIA: Yes.

14 No offers will be accepted after the noted time
15 and date. That is at the Seattle district office.

16 Does everyone have that address? If not, you'll
17 find it in the Solicitation as well.

18 Standard form 1442-Solicitation, Offer and
19 Award: Ensure all amendments are acknowledged and the
20 Corporate Certificate correctly completed. For large
21 business, make sure that you submit the Small Business
22 Plan as well.

23 The government intends to make award based on
24 the lowest price technically acceptable. The technically
25 acceptable criteria are spelled out in the Section 00110.

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1 Read the Section 00110 and provide the information that's
2 requested.

3 For the purposes of this project, a firm is
4 considered a large business if the average annual receipts
5 are \$28 million.

6 Subcontracting Plan must be submitted with the
7 offer from large businesses.

8 Section 00110: The contract will be awarded to
9 the firm submitting the lowest price technically
10 acceptable. There will be a Source Selection Evaluation
11 Panel to review all the technical proposals, and once they
12 have -- either have been accepted or rejected, we'll then
13 go to the lowest price. There is no ranking.

14 Proposal prepared -- preparation costs will not
15 be paid. In other words, whatever you put together as far
16 as your proposal, that's at your expense. The government
17 does not reimburse.

18 Debriefings may be requested in accordance with
19 the FAR. You have all of this. Do you want me to go each
20 of these individually or -- okay. You will find all of
21 this exact same information in the handout that I gave
22 you.

23 By the way, on post-award debriefings, any
24 unsuccessful offeror, if you request a debriefing, it will
25 be in writing.

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1 The evaluation factors provides the Technical
2 Evaluation Criteria, as well as the Evaluation and Award
3 Procedures. We tell you what we are going to evaluate and
4 how we're going to grade it.

5 Relevant Experience of the Prime Firm: You have
6 to provide by description three projects in the past seven
7 years, one of similar climatic conditions. You do not
8 have to complete -- have completed the project. You may
9 be working on it at the present time, but it does have to
10 be far enough along that it can be evaluated by the --
11 whoever you have this contract with.

12 For example, let's say that you're doing
13 something for the State of Montana, and you're 50 percent
14 complete. They can evaluate that, and they can provide a
15 written assessment. We do usually go to CCASS to pull up
16 the evaluations that are in there.

17 Qualifications of Key Team Members: This would
18 be in resume format. There is also a sample in the
19 Section 00110. We need the -- all the information on the
20 project superintendent, the project manager, and a CQC
21 system manager.

22 Your past performance, as I said, we'll pull
23 that out of CCASS. That is, for those who do not have or
24 have not worked for the federal government before, there
25 is a Customer Satisfaction Survey form at the back of the

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1 Section 00110 which can be given -- excuse me, which can
2 be given to your customer. They can fill this out and fax
3 it to me.

4 If any prime submits to my office a Customer
5 Satisfaction Survey through their office, whoever the
6 prime might be, it will be disposed of. It has to be
7 submitted directly from the person who is giving the
8 rating.

9 Read descriptions of the evaluation criteria
10 thoroughly. There's nothing tricky in there. Just read
11 it and do what it says.

12 Ensure proposal is complete and reflects all
13 elements required by the Solicitation to at least meet the
14 minimum criteria. I can't over emphasize that, that this
15 will be only the minimum criteria. That's all you're
16 going to be evaluated at.

17 Technical proposals are evaluated on their own
18 merit and against the evaluation criteria only, not
19 against any other proposals. That's what I was saying a
20 moment ago. There is no ranking. Once the -- you submit
21 your proposal, we will evaluate it, and it is either
22 acceptable or not acceptable.

23 Proposals submitted in two parts: You got your
24 technical and your price.

25 Technical Evaluation Ratings-Definitions.

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1 Acceptable: This is -- also you will find it in the
2 Section 00110. You also have it in your handout there.
3 But acceptable, an acceptable rating indicates that the
4 offer has provided sufficient information to meet the
5 minimum qualifications/standards described in the
6 technical evaluation factor.

7 So you may have what appears to have two
8 companies, one is far superior than the other, but when we
9 rated them both, they both came out as acceptable, so then
10 we'd go to the lowest price.

11 Nonacceptable: A nonacceptable rating indicates
12 that the offer has not provided sufficient information to
13 meet the minimum qualifications/standards described in the
14 technical evaluation factor.

15 A while back we had a number of people who were
16 eliminated because they had not complied with what the
17 Section 00110 called for. Since they hadn't, we had no
18 choice but to eliminate them.

19 Price Evaluation: Price will be evaluated for
20 reasonableness to assess the offeror's understanding of
21 the contract requirements and any risk inherent in the
22 offeror's approach. We simply review them to make sure
23 that you understand what you're bidding on.

24 Financial capacity and bonding ability will be
25 checked. We do call the bonding companies and make sure

PRE-PROPSAL SITE VISIT, MALMSTROM AFB, MONTANA TAKEN 5/29/2003

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1 that everything is kosher, if you will.

2 It is the intent of the government to make award
3 based upon the initial offers without further discussion
4 or additional information.

5 So, to be nice about it, we're going to make
6 every effort possible. If we've got two bids that are
7 identical, there would be discussion. If there's a nickel
8 difference, the lowest bidder will get it.

9 It is the intent of the government to make award
10 based upon the initial offers.

11 Okay, a firm fixed-priced contract will be
12 awarded to one firm submitting the lowest price
13 technically acceptable offer. So that is our intent at
14 this time, to award this with no discussion, one contract,
15 a firm fixed price.

16 Competitive Range. Now, this goes into if we
17 have two firms submitting identical prices. You can read
18 this over at your leisure, but basically what it is, we
19 would establish a competitive range in that case, and if
20 to clarify this, we would go to discussions.

21 Section 00600 is your certs and reps. When you
22 submit your package, it must be completed and submitted
23 with the proposal.

24 Section 00700, your contract clauses, this
25 contains all the clauses in full text which will affect

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1 the contract at the time of award. Make sure you read
2 over them, and make and comply with what they're
3 requesting.

4 Special clauses, unique clauses: Commencement
5 of this contract is the date that the contractor receives
6 the Notice to Proceed. So when we award this, the
7 effective date will be the date of the Notice to Proceed.
8 And this contract is to be completed within 440 days,
9 calendar days, of the Notice to Proceed.

10 There are liquidated damages. These are
11 located, you will find the letter, in the Section 00800.

12 And Performance of Work by the Contractor: The
13 prime contractor must perform at least 15 percent of the
14 work.

15 FAR 52.222-6 Davis Bacon Act. This establishes
16 the minimum amount to be paid. Davis Bacon wage
17 determination for the geographical area of this project.

18 You can also find this FAR -- this FAR clause at
19 "farsite" at Hill Air Force Base.

20 You might -- just point of interest, if you
21 like, you might want to look at the FAR clause, and then
22 it will refer you back to the prescription which says that
23 that is to be used.

24 Check the Corps of Engineer's web site for
25 amendments. We put these out on a regular basis. They

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1 are -- this is the only place that the amendments are
2 posted.

3 I know that recently somebody was going through,
4 I think it was a Montana contractor's site, and they were
5 not posting the amendments as we put them out, and they
6 came up short about two amendments. You need to check
7 this web site, right here, www.nws.usace.army.mil. I
8 would recommend you check it at least twice a week,
9 because I don't want to see anybody be eliminated because
10 they didn't get everything.

11 Ensure you have completed all information
12 required by the Solicitation packages. Submit those items
13 with your proposal. Again, I can't over emphasize, read
14 Section 00110 and comply with it.

15 Ensure compliance with the Solicitation
16 requirements. Solicitation is only changed via written
17 amendment. So if you have got a question, let's say, for
18 example, you find something on a drawing, submit that to
19 Techbid, and they will clarify it, and we'll put it out as
20 an amendment.

21 The government intends to award the initial
22 offers to the firm that is technically acceptable and
23 submitting the lowest-price offer.

24 Does anyone have any questions?

25 MR. WITHAM: Mark Witham, Liberty Electric.

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1 On -- I know I discussed part of this with you
2 yesterday, Alan -- on sheet EE03, just the notes down
3 here, on building numbers, I believe there was a typo on
4 some of them buildings numbers. Evidently they were
5 repeated under some of these other clauses. But under bid
6 option item on the flag notes, but also over here on
7 Building 14031, it's kind of drawn out of the scope. Is
8 that in the scope of work? It isn't included in the base
9 item numbers up here on the flag notes, either
10 (indicating).

11 MR. DeGONIA: Could I have you submit that
12 through Techbid, and if there is a problem, we'll have
13 them evaluate it and get an amendment out --

14 MR. WITHAM: Okay.

15 MR. DeGONIA: -- if you would, please?

16 MR. NAKAMOTO: When you do that, sir, you should
17 reference the plate numbers that you are looking at, so we
18 can get the correct one, because we have multiple drawings
19 that show basically the same things. But if you could
20 kind of reference that and the plate number, the drawing
21 detail, if that would be appropriate --

22 MR. WITHAM: Okay.

23 MR. NAKAMOTO: -- that would probably facilitate
24 the answer.

25 MR. DeGONIA: Are there any other questions?

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1 Yes.

2 MR. OSWOOD: Nick Oswood, Oswood Construction
3 Company.4 You mentioned that you evaluate prices for
5 reasonableness and to make sure that the contractor
6 understands what they're bidding on. How do you do that?7 MR. DeGONIA: Basically, what we do is we take a
8 look at it to make sure that they have submitted an offer
9 for each item in the bid schedule.10 And for example, let's say that in looking at
11 this and evaluating it, we find that everybody has, for
12 one item in there, a range of like, say, between 1,000 to
13 \$4,000, which is a pretty good spread, and then we've got
14 someone who comes up with an offer that is like \$50. That
15 kind of indicates to us that there's a problem, and we
16 just make sure that it's correct, it's not a typo.17 MR. OSWOOD: Okay, and that kind of segues into
18 my next question. There's 29 bid items on this project
19 again.

20 MR. DeGONIA: Yeah.

21 MR. OSWOOD: I know we've commented on this
22 before, and I understand that you guys are -- don't
23 exactly know what the bids are going to be and are trying
24 to get the most for your money, but it makes it incredibly
25 hard on the general contractor, and I'm sure the

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1 subcontractors, to try to put together a bid for 29 items,
2 and the bids for each item correspondingly go up, because
3 of the risk associated with so many bid items.4 Is there any way that you guys could reduce the
5 number of bid items?

6 MR. NAKAMOTO: Let me answer that question.

7 Nick, first of all, I want to let you know that
8 we are not bid shopping, because the FAR clause
9 specifically prohibits us to do that. Every option is
10 intended to be awarded. We are not allowed to put in a
11 line item that we have no intention to award.12 Now, I want to also frame this answer that
13 whenever we do a solicitation, prior to advertisement, it
14 goes through the contracting officer, which is Tom
15 DeGonia's supervisor, to assure that the schedule and the
16 design is compatible and it is not forthwith going to do
17 harm to the solicitation, and finally it goes to the
18 Office of Counsel to assure that what we're asking for is
19 reasonable and meets all federal requirements.20 So the fact that we have 29 options is because
21 when we do a government estimate, we try to determine by
22 headquarters' regulations what we need to be within the
23 program amount. There is no way that we can advertise a
24 project if we didn't have funds available. In other
25 words, we couldn't advertise something if we knew that the

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1 moneys may or may not be there.

2 So on that basis, then, the Air Force has a
3 regulation, and this is an Air Force agency, and the
4 requirement is to provide options, so that we can award as
5 much as we can on a project that has been allocated for
6 that particular project itself.7 Now, if we advertise a project under a base bid
8 and we didn't have enough money, the total effort gets
9 canceled, no question. There is no other means/avenue
10 that we can change our mind.11 So to assure that we get our cost estimate to
12 come within a certain percentage, and we expect that
13 percentage to be a percentage that, given all the
14 variables, that it is possible to award. In other words,
15 we take our percentage of what moneys we have, and we set
16 aside to design that project for that amount of money.17 If the bid comes in lower, we can award options
18 if the bid. If the bid goes up higher, then we don't have
19 to award the option, but we still have a project. There
20 is nothing more disturbing than to have a project
21 advertised, only to cancel because we didn't do the
22 project the correct, you know, way to assure ourselves
23 that we can award the project.

24 MR. OSWOOD: Right.

25 MR. NAKAMOTO: So the fact that we have 29

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1 options is because the options are broken down into
2 different units that we're going to build, and along with
3 those units, we have associated things that we construct.
4 In this case we're doing fencing and we're doing some
5 other associated work, and the reasonableness of having 29
6 options is that we don't want to award a part of options
7 if we didn't have the major improvements with it.8 As an example, we don't want to award fencing if
9 we're not going to put up a house. We would rather put up
10 a house before we put up an option for fencing, as an
11 example, because we get more houses for the program
12 amount, for the key program requirements that the customer
13 expects us to construct.14 And I know that 29 options is very difficult.
15 In fact, contracting will always say that when you have a
16 lot of options, they always want us to combine it or just
17 simply do a better job in design, so that we don't have to
18 have so many options.19 That's the answer I can give you. If you -- if
20 you want more clarification, we'll probably have to ask
21 you to do a Techbid, because the answer might come
22 different from, say, the contracting officer.23 MR. WITHAM: Mark Witham, Liberty Electric
24 again.

25 I think one of the things Nick's kind of

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1 mentioning, too, though, is with us, on our part of it,
 2 when you have, say, the utilities are our -- our -- the
 3 electrical coming into the buildings is a separate bid
 4 item from the electrical on the buildings, and, like I
 5 said, ideally, when you have maybe separate bid items, you
 6 might have a general that could come in and have a
 7 separate contract for doing one part than another part,
 8 two separate, okay?

9 Well, you just draw a line saying you're five
 10 feet out of the buildings is where the parts separate.
 11 Well, the guy bringing the utilities really has to run
 12 that conduit all the way to the building and up to the
 13 service. You don't just cut that wire off there at the
 14 conduit. And the other guy's doing the same thing there.
 15 So now both of them, one -- somebody's got to up their
 16 price or both of them up their price on both their bid
 17 items, just to try and cover themselves probably, so
 18 you're increasing your total price.

19 MR. OSWOOD: And you are certainly not going to
 20 award the utilities for a structure without the structure
 21 itself. And I understand that some of this occurs,
 22 because I know that you track these funds and that this
 23 goes into a reporting system that says this was for
 24 utilities, this was not for utilities, but it would be
 25 much easier for us to provide that information after the

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1 bid than try to sort our way through 29 different items.
 2 I mean, on a typical bid day, we'll get 200 quotes on
 3 these items, and we have to call all these people and sort
 4 out what they're bidding.

5 I mean, for example, the fencing. The fencing
 6 price for one of these units might be \$1,000. The
 7 increase in our total bid for this project is probably
 8 more than that option, because it's such a small option,
 9 just to sort out this mess.

10 So I mean, when you have like fencing, for
 11 example, you know, just -- just putting the bid item on
 12 this costs us more than the whole item is worth, so you
 13 guys are going to get hit for it twice, basically.

14 And I mean, we just bid one of those projects
 15 here a few months ago. You guys should have a good idea
 16 what each house is going to go for, or at least -- at
 17 least a narrower range than 29 bid items.

18 MR. NAKAMOTO: Nick, the only thing I can say
 19 for that is, you know, we scrutinize our projects to what
 20 the customer and the user eventually will recommend that
 21 we focus in on, and our priorities are, in the case of
 22 housing, to provide as much housing as we can.

23 We have had internal discussions as to how we
 24 formulate our proposals, bid items, and how we do our
 25 options, and it is a complicated thing. So your comment

Page 23

1 is, you know, worth studying. The only thing I can say
 2 right now is we'll take your opinions and comments, and
 3 we'll try to work in a much better process.

4 MR. OSWOOD: I understand it's a very
 5 complicated issue and there's a lot of factors playing
 6 into it that the contractor doesn't see, but on -- for
 7 example, on this project, I bet you're paying, again,
 8 because of uncertainties -- we don't know how long the
 9 project's going to run, because we don't know how much is
 10 going to be awarded; we don't know how we can phase it,
 11 because we don't know how many units are going to be
 12 awarded; we don't know what kind of supervision we're
 13 going to need, because we don't know how big the project
 14 is -- you probably pay, from our perspective, I don't
 15 know, a five to ten percent price premium just for having
 16 this number of options.

17 I mean, Mark, what -- what do you think?

18 MR. WITHAM: Yeah.

19 MR. DeGONIA: You know, actually, the 30 items,
 20 I've put a project together a while back, not out of the
 21 Corps, but I had 36,000 line items. So that will give you
 22 an idea that some of these can get quite extensive.

23 MR. NAKAMOTO: For the value, too, you have to
 24 understand.

25 MR. OSWOOD: Right, and some of these things can

Page 24

1 be handled by change orders after the fact, too, if you
 2 want to add them at a later point.

3 MR. NAKAMOTO: When we do these things, you
 4 know, the customer, meaning Malmstrom -- no, the customer
 5 is the Space Command, the user is Malmstrom, they have
 6 priorities that they would like to meet. We're listening
 7 to their expectations, their programming needs.

8 Mr. Korslien represents the Corps, but he is
 9 forward, and he works with the base carefully, and we try
 10 to formulate a project that will satisfy as much of the
 11 needs as we can with the available funds that are given to
 12 us.

13 We compete for those funds, so whenever they are
 14 allocated to Malmstrom Air Force Base, you know, we try to
 15 do the best we can, so that in any given program year, the
 16 maximum amount of improvements will be put forth, rather
 17 than put back into the system.

18 MR. OSWOOD: Right.

19 MR. NAKAMOTO: I cannot delineate any more as to
 20 why we have 29 options. Our contracting office always
 21 wants us to reexamine or examine how we put those line
 22 items together, and it is -- it is a true fact that if we
 23 had a base and one or two options, it would be a much
 24 better bid price. We understand that.

25 Historically, it has always shown that the

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1 simpler you make the project, the better off you will be.
2 But it's balanced with the needs and urgency of what we're
3 doing, so...

4 MR. OSWOOD: Right, and this is by no means a
5 problem inherent to the Corps of Engineers. I mean, this
6 happens on a lot of projects that the State of Montana is
7 notorious for.

8 And I have even another problem on some of our
9 projects where -- I mean, for example, they will have
10 \$1 million, and they will have enough bid items that they
11 can award exactly \$1 million dollars of work, leaving them
12 nothing for any possible problems or anything that comes
13 up in the future, you know, and inherently there's going
14 to be some unforeseen circumstances or something, and
15 they've spent every dollar they have. I mean, it just --
16 it's dangerous.

17 MR. NAKAMOTO: The last thing I want to say is
18 when we put a project together, we have a calendar date
19 period that we include in our fee so that should moneys
20 arrive within that given period, then the total contract
21 calendar days can be awarded. So we always do
22 anticipation, but the balance is that we want to be sure
23 that we can award a project timely.

24 MR. OSWOOD: Uh-huh.

25 MR. KORSLIEN: One other point I'd like to add

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1 to that, too, is that a lot of the structuring of all
2 these option bid items reflects the tight funding
3 available at headquarters in years past, where they've had
4 a larger program to work with and possibly had more
5 discretionary funds, that if one bid came in a bit high,
6 they could rob another project or -- or perhaps delay
7 another project, so that they could apply the whole to
8 this one project that maybe bids came in high. And -- and
9 basically, they're pretty strapped these days. They're --
10 I mean, they're really robbing from Peter to pay Paul to
11 make things happen.

12 And that's the only option that's left to us, is
13 that in the case of this project, we had the four optional
14 buildings, and of course, each one of those buildings had
15 probably three option bid items. You had one for the
16 building, you had one for the utilities, and then one for
17 the fencing, and then we had the countertop upgrade,
18 but -- so those four optional buildings pretty much spin
19 off 12 of those option bid items, so -- and it doesn't
20 make our job any easier, either. We have to have more
21 stuff in the drawings to indicate all of those little
22 jurisdictional areas. And so it's -- no one's happy with
23 it, it increases everyone's work, but that's just a fact
24 of life with the funding.

25 And our intent is to be able to buy every last

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1 piece of work that we can get with the amount of funds
2 that come in based on the bids, and try to structure it so
3 that each one of those option buildings is a complete and
4 usable unit, i.e., with the yard, fence, with -- with what
5 other upgrades that may be part of the other base bid
6 buildings.

7 So we try to whittle this down as much as
8 possible, and basically we're where we're at,
9 unfortunately. You know, we're kind of all stuck with
10 that number of bid items.

11 MR. OSWOOD: And on another note here, too, I
12 mean, general contractors, and also our subs, spend a
13 tremendous amount of money bidding these projects. I
14 mean, it probably costs us 10 to \$15,000 to bid one of
15 these projects, and we would appreciate it if we would at
16 least get, you know, a letter or a fax or something from
17 the Corps to say thank you for your bid, you know, we're
18 sorry you're the low bidder. Usually we don't even find
19 out until we're checking the Internet and it gets archived
20 and awarded to somebody.

21 MR. DeGONIA: I send out -- on the projects that
22 I handle, I send out sorry letters to everybody
23 immediately, and -- but that goes out after I've notified
24 the winning firm --

25 MR. OSWOOD: Right.

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1 MR. DeGONIA: -- and normally that's -- there's
2 about a day's difference is all.

3 MR. OSWOOD: And if -- if someone's excluded
4 from the bid, too, at an early stage, it would be nice if
5 we got a letter saying that, too, so that we don't sit
6 there for three months wondering if we've got to hold a
7 superintendent or hold our bonding capacity, because we
8 might --

9 MR. DeGONIA: You do, you're notified
10 immediately. For example, there was one project that I
11 had recently where the contracting officer overturned the
12 evaluation board's decision, and I couldn't notify anybody
13 until this was accepted or rejected by the contracting
14 officer, and at that time I notified everybody either,
15 one, they won it, or they didn't get it.

16 MR. NAKAMOTO: Yeah, Nick, let me address it a
17 little bit more. Taking your comments, you know, that's a
18 serious matter, but you have to understand, under the
19 proposal, we are not able to issue out denial letters
20 until the contract has been awarded.

21 Now, it takes a little bit more effort in trying
22 to explain to the general public what we mean, because
23 after we look at the evaluations, we need to do a source
24 selection, and that source selection does take time to put
25 together a brief, and then it moves on to making an award,

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1 but before that happens, the customer has the authority to
2 send me a letter authorizing award. And up until that
3 award letter is received by me from the customer, we
4 cannot make an award. So...

5 MR. OSWOOD: Right, but you could notify those
6 firms that were rejected based on technical merits.

7 MR. NAKAMOTO: No, no, we are not able to do
8 this, because the associated reasons for giving this is,
9 like Tom said, if it was overturned, we have now
10 eliminated or have caused elimination of that contractor
11 to be viable again.

12 I don't know, did you understand what I tried to
13 tell you? In other words, we could not give a denial
14 letter until we physically made an award through an
15 authority to award letter from the Air Force.

16 MR. OSWOOD: So you're worried that perhaps if
17 someone does not meet the requirements of the RFP in the
18 technical section, that then the Air Force comes back and
19 says, Well, we don't care, we want to award it to them
20 anyway?

21 MR. DeGONIA: No, no. What happens is we'll
22 receive your proposals, and normally within one to two
23 days, if it's a weekend, say three days, we will have a
24 Source Selection Board meeting. A Source Selection Board
25 will go over every proposal that's submitted, not the

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1 price proposal, only the technical proposal --

2 MR. OSWOOD: Uh-huh.

3 MR. DeGONIA: -- and see if all the criteria
4 which are spelled out in Section 00110 are met. If they
5 are met, that firm is acceptable. If, for whatever
6 reason, let's say, for example, you don't include a
7 superintendent, then that would mean -- actually, it would
8 be a -- a noncompliance with the Section 00110, which
9 could result in that firm being eliminated.

10 I do the write-up based on what the Source
11 Selection Board tells me, and then I present this to the
12 contracting officer. The contracting officer reviews it,
13 and they can either accept it or reject it. In some cases
14 they overturn some of the particular proposals, but that's
15 basically where -- what happens in the process. As soon
16 as it's -- the source selection document is signed by the
17 contracting officer, at that point in time, I send the
18 congratulation letter out and the sorry letters out at the
19 same time.

20 MR. OSWOOD: And then go it goes on to a price
21 evaluation?

22 MR. DeGONIA: The price evaluation is done
23 before we send the sorry letters out. That's done -- as a
24 matter of fact, that's being done at the same time that
25 the Source Selection Board is meeting, so that both paths

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1 cross at the same time. That's in that source selection
2 document that I was talking about.

3 MR. NAKAMOTO: And embedded in that time frame,
4 Tom gives me the bid results. I transfer that to the
5 customer. The customer then gives me a letter of award.
6 Until that letter of award is given, the contracting
7 officer will not make an award.

8 MR. DeGONIA: And nobody's been eliminated.

9 MR. NAKAMOTO: And nobody's been eliminated to
10 that point. So the proposal due date and that particular
11 activity following is not one day.

12 MR. DeGONIA: So we're talking -- I could -- we
13 could have it all done in as short a period of time as a
14 week to a week and a half. Normally it takes longer than
15 that.

16 MR. NAKAMOTO: I try to hurry them up, of
17 course, but it all depends on how you do the write-up.

18 MR. OSWOOD: I mean, some of these projects we
19 bid for the Corps, it's been three months before we found
20 out.

21 I mean, for instance, on the last project where
22 we bid renovating those, we didn't even get a letter to
23 say thank you, the project's been canceled. We found out
24 because that's what the Internet said like three or four
25 months down the line.

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1 MR. NAKAMOTO: I will just make a short comment
2 on that.

3 MR. DeGONIA: I'm guilty.

4 MR. NAKAMOTO: Nick, the situation on that is
5 the Air Force had to issue me out a letter of
6 cancellation, and without going into real deep detail on
7 it, that letter of cancellation went through every
8 programing issue, and it was the Command that had to
9 provide a cancellation letter. We do not have that
10 authority, and we did not have that authority to cancel.

11 Just to let you know, we in the Seattle district
12 struggled very hard to get this award canceled, because it
13 was holding up contractors' bonds, and we knew exactly
14 what the implication was by not giving that letter of
15 cancellation. As an example, you would not be able to,
16 you know, bid on another project if your bonding capacity
17 was limited.

18 So, yeah, it took a long time in coming, let me
19 tell you. I had to get a personal visit to get this
20 letter, because we did not know what was going on, but we
21 finally forced that letter out. And it wasn't even to the
22 points that we wanted to have that letter say. It was
23 vague, so we had to do it again, and eventually we
24 overcame the events and we got it canceled.

25 So that was a dark cloud. And how we did

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1 determine -- I mean, that was very embarrassing. It was
2 very difficult, to say the least.

3 MR. OSWOOD: I'm not sure we ever did receive a
4 letter in regard to that project.

5 MR. NAKAMOTO: I can't say one way or the other
6 on that. I talked with -- okay, is there another general
7 question?

8 (Discussion off the record.)

9 MR. DeGONIA: Any other questions?

10 MR. FRANCETICH: Rob Francetich, MCS
11 Environmental. It's requiring a certified industrial
12 hygienist to do abatement on one location. I called just
13 to clarify that you needed certified industrial hygienist.

14 MR. DeGONIA: You sent me an e-mail, didn't you?

15 THE DEFENDANT: Yes, I did.

16 MR. DeGONIA: I sent it to Techbid. Has Techbid
17 got back to you yet?

18 MR. FRANCETICH: I haven't been in my office all
19 week, so...

20 MR. DeGONIA: They -- they may have already
21 answered you, but Techbid is aware of it, and they did
22 send it out to the experts.

23 MR. FRANCETICH: Okay. For the quantity that's
24 left here, there's a very high demand for that.

25 MR. DeGONIA: But that would be one of the

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1 technical items that would have to go through Techbid.

2 THE WITNESS: Okay.

3 MR. DeGONIA: I just forward it on to them. So
4 as not to make you file that, or I put you off or anything
5 because I couldn't get back to you, I send it to the right
6 guy.

7 MR. FRANCETICH: Okay, there's just not a whole
8 lot here that we would need to send a CIH for this size
9 and amount of asbestos that's in this one building, so I
10 just thought it was overdone.

11 MR. NAKAMOTO: Are there any other questions?

12 MR. OSWOOD: Sorry, I'm going to terrorize you
13 with one more question.

14 MR. NAKAMOTO: Okay. That's okay, Nick.

15 MR. OSWOOD: Is it possible to get the bid
16 results on these projects?

17 MR. DeGONIA: When you say, "bid results," are
18 you talking about, what?

19 MR. OSWOOD: Dollars.

20 MR. DeGONIA: It's posted. It's posted to the
21 Internet and --

22 MR. OSWOOD: Well, I --

23 MR. DeGONIA: We tell -- it goes right out there
24 for public consumption as to what the contract was awarded
25 for.

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1 MR. OSWOOD: Right, but the only thing we see on
2 that is the low bidder's award. We don't see any of the
3 other people's bids.

4 MR. DeGONIA: You are not going to see those.
5 That's confidential, proprietary in some cases, depending
6 on the type of proposal that we have out.

7 MR. NAKAMOTO: Nick, what you're referring to is
8 a public bid readout, which is -- which is the Invitation
9 for Bid.

10 MR. OSWOOD: Uh-huh.

11 MR. NAKAMOTO: In this case, it's a Request for
12 Proposal.

13 MR. OSWOOD: I don't understand how this can be
14 proprietary knowledge if it's going to be published if
15 you're low.

16 MR. NAKAMOTO: It is published for the winner.
17 It's posted on the net. But because it's a Request for
18 Proposal, you do not divulge.

19 MR. OSWOOD: And I just don't understand how
20 this can be confidential in a government bid, why you can
21 keep confident the bids.

22 MR. DeGONIA: Okay, basically what it is is the
23 FAR, Federal Acquisition Regulations, has stipulations in
24 there that tells us that we will not make other than the
25 low bidder proposal public.

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1 If you have any questions regarding any other
2 bids or where everybody fell in the overall scheme of
3 things, you can submit a request through the Freedom of
4 Information Act to the Freedom of Information Act officer
5 at the Seattle District Corps of Engineers, and we will
6 reply -- or they will reply.

7 MR. OSWOOD: Right, we've done that before to
8 get bid results, and it just takes about a year for it to
9 grind through channels before you actually get them.

10 Mr. DeGONIA: And they don't give them to you in
11 most cases.

12 MR. OSWOOD: Every time we've done that, we've
13 received them, but it's taken 12 months.

14 MR. DeGONIA: And we're not -- to be quite
15 truthful with you, we're just not supposed to tell
16 according to the FAR.

17 MR. NAKAMOTO: FAR regulations, Nick, you know,
18 it's published, and it's very specific. Our Office of
19 Counsel scrutinizes that backwards and forwards. It goes
20 up to the division, our headquarters. And it's very
21 specific. It's the method of procurement you're talking
22 about.

23 MR. BRUS: This is something that's changed in
24 the last 10 years or something; is that right?

25 MR. NAKAMOTO: FAR requirements?

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1 MR. BRUS: Yes. It used to be when you opened
2 bids, all the contractors could be there and you had a
3 listing.

4 MR. DeGONIA: If you have a sealed bid, that
5 still occurs.

6 MR. NAKAMOTO: That's correct, it's through
7 Invitation for Bid, and it still occurs; however, we have
8 selected and chosen our method of procurement that is the
9 best method that we would like to achieve based on our
10 customer's demands.

11 MR. DeGONIA: But --

12 MR. NAKAMOTO: I didn't say wishes now, I said
13 demands.

14 MR. DeGONIA: The FAR changes on a daily basis.
15 Any other questions?

16 (Discussion off the record.)

17 MR. NAKAMOTO: Are there any questions related
18 to the project? If not, we would like to adjourn. So if
19 anybody has, please let it be known now.

20 If not, Court Reporter, the session is now
21 concluded at 10:35.

22
23
24
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1 **CERTIFICATE OF REPORTER**

2 I certify that the foregoing is a true and
3 correct minutes transcript from the record of proceedings
4 in the above-entitled matter.

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8 LISA LEWIS DEVINE, RMR DATE
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SECTION 02721 - SUBBASE COURSES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. The compaction testing results

should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all aggregates actually used.

SD-06 Test Reports

Sampling and Testing

Copies of initial and in-place test results.

1.3 DEGREE OF COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557. In this specification, degree of compaction shall be a percentage of laboratory maximum density.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved testing laboratory in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Tests shall be performed at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the Contracting Officer will observe the sampling.

1.4.2 Tests

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The maximum density and optimum moisture shall be determined in accordance with ASTM D 1557.

1.4.2.4 Density Tests

Density shall be field measured in accordance with ASTM D 1556.

1.4.2.5 Wear Test

Wear tests shall be made on subbase course material in conformance with ASTM C 131.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

- a. Sieve Analysis including 0.02-mm size material
- b. Liquid limit and plasticity index moisture-density relationship

1.4.3.2 In-Place Tests

One of each of the following tests shall be performed on samples taken from the placed and compacted subbase course. Samples shall be taken for each 250 square yards of each layer of material placed in each area.

- a. Sieve Analysis including 0.02-mm size material
- b. Field Density
- c. Moisture liquid limit and plasticity index

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted subbase course.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Subbase Course

Aggregates shall consist of crushed stone or slag, gravel, shell, sand, or other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 3 inches and shall be within the limits specified as follows:

Maximum Allowable Percentage by Weight Passing Square-Mesh Sieve				
Sieve Designation	No. 1	No.2	No. 3	No.4
No. 10	50	80	--	85
No. 200	5	5	5	5

Particles having diameters less than 0.0008 inches shall not be in excess of 3 percent by weight of the total sample tested as determined in accordance with ASTM D 422. The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

All clearing, stripping and excavating work involved in the opening or operation of aggregate sources shall be performed by the Contractor. Aggregate sources shall be opened to working depth in a manner that produces excavation faces that are as nearly vertical as practicable for the materials being excavated. Materials excavated from aggregate sources shall be obtained in successive cuts extending through all exposed strata. All pockets or strata of unsuitable materials overlying or occurring in the deposit shall be wasted as directed. The methods of operating aggregate sources and the processing and blending of the material may be changed or modified by the Contracting Officer, when necessary, in order to obtain material conforming to specified requirements. Upon completion of work, aggregate sources on Government reservations shall be conditioned to drain readily, and shall be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled

areas designated by the Contracting Officer so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase course, the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the subbase course is placed.

3.4 GRADE CONTROL

The finished and completed subbase course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the subbase material at the water content specified. The Contractor shall make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.7 COMPACTION

Each layer of the subbase course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer is compacted through the full depth to at least ~~100~~95 percent of laboratory maximum density. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.8 PROOF ROLLING

Areas designated on the drawings to be proof rolled shall receive an application of 30 coverages with a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 30,000

pounds and inflated to a minimum of 150 psi. Coverage is defined as the application of one tire print over the designated area. In the areas designated, proof rolling shall be applied to the top layer of the subbase course. Water content of the top layer of the subbase course shall be maintained such that the water content is within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. Any material in the subbase courses or underlying materials indicated to be unsatisfactory by the proof rolling shall be removed, dried, and recompact, or removed and replaced with satisfactory materials.

3.9 EDGES

Approved material shall be placed along the edges of the subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.10 SMOOTHNESS TEST

The surface of each layer shall not show deviations in excess of 3/8 inch when tested with a 12 foot straightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding this amount shall be corrected by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.11 THICKNESS CONTROL

The completed thickness of the subbase course shall be in accordance with the thickness and grade indicated on the drawings. The thickness of each course shall be measured at intervals providing at least one measurement for each 500 square yards or part thereof of subbase course. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course. The completed subbase course shall not be more than 1/2 inch deficient in thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, the Contractor shall correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more than shown, the course will be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.12 MAINTENANCE

The subbase course shall be maintained in a satisfactory condition until accepted.

END OF SECTION 02721

SECTION 02722 - AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregates
ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(1988; R 1993el) Specific Gravity and Absorption of Course Aggregate
ASTM C 128	(1997) Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Compaction Test Plan; G

Contractor is required to submit for approval a compaction-testing plan. This submittal is required prior to the start of field activities. The lift and approximate location of each anticipated test should be depicted on the testing plan. After completion of the aggregate base course installation, the compaction testing results should be keyed to the plan and submitted to the government prior to the final inspection and BOD.

SD-06 Test Reports

Sampling and testing Field Density Tests

Calibration curves and related test results prior to using the device or equipment being calibrated. Copies of field-test results within 24 hours after the tests are performed. Certified copies of test results for approval not less than 30 days before material is required for the work.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the Contracting Officer will observe the sampling.

1.4.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The maximum density and optimum moisture content shall be determined in accordance with ASTM D 1557.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556

1.4.2.5 Wear Test

Wear tests shall be made on ABC course material in conformance with ASTM C 131.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

- a. Sieve Analysis including No. 635 size material.
- b. Liquid limit and plasticity index.
- c. Moisture-density relationship
- d. Wear.

1.4.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated.

- a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.
- b. Sieve Analysis including No. 635 size material shall be performed for every 500 tons, or portion thereof, of material placed.
- c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted ABC.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 PRODUCTS

2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, crushed recycled concrete, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

- a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.
- b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.
- c. Crushed Recycled Concrete: Crushed recycled concrete shall consist of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. Crushed recycled concrete shall meet all other applicable requirements specified below.
- d. Crushed Slag: Crushed slag shall be an air-cooled blast-furnace product having an air dry unit weight of not less than 65 pcf as determined by ASTM C 29/C 29M, and shall meet all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3

2 inch	100	----	----
1-1/2 inch	70-100	100	----
1 inch	45-80	60-100	100
1/2 inch	30-60	30-65	40-70
No. 4	20-50	20-50	20-50
No. 10	15-40	15-40	15-40
No. 40	5-25	5-25	5-25
No. 200	0-5	0-5	0-5

NOTE 1: Particles having diameters less than 0.0008 inch shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.1.4 Liquid Limit and Plasticity Index

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Aggregates shall be obtained from offsite sources.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the ABC, the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the ABC, the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the ABC. Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the ABC is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant. The Contractor shall make adjustments in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory ABC meeting all requirements of this specification.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall exceed 6 inches or less than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the ABC is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable ABC.

3.5.3 Grade Control

The finished and completed ABC shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required ABC thickness so that the finished ABC with the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The ABC shall be placed so that the completed section will be a minimum of 5 feet wider, on all sides, than the next layer that will be placed above it. Additionally, approved fill material shall be placed along the outer edges of ABC in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of ABC. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the ABC shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least ~~100~~95 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory ABC. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the aggregate course shall be as indicated. No individual layer shall exceed 6 inches nor be less than 3 inches in compacted thickness. The total compacted thickness of the ABC course shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2-inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the ABC course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3-inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of ABC shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of ABC is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic

marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompactd or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12-foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50-foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Traffic shall not be allowed on the completed ABC course.

3.7 MAINTENANCE

The ABC shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any ABC that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of ABC that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

END OF SECTION 02722

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SECTION 02731 - AGGREGATE SURFACE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 3740	(1999c) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

1.2 DEGREE OF COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated herein as present laboratory maximum density.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation

identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Sampling and Testing Density Tests

Calibration curves and related test results prior to using the device or equipment being calibrated. Copies of field-test results within 24 hours after the tests are performed. Test results from samples, not less than 30 days before material is required for the work. Results of laboratory tests for quality control purposes, for approval, prior to using the material.

1.4 EQUIPMENT

All plant, equipment, and tools used in the performance of the work covered by this section will be subject to approval by the Contracting Officer before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, and meeting the grade controls, thickness controls, and smoothness requirements set forth herein.

1.5 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory or by the Contractor, subject to approval. If the Contractor elects to establish its own testing facilities, approval of such facilities will be based on compliance with ASTM D 3740. No work requiring testing will be permitted until the Contractor's facilities have been inspected and approved.

1.5.1 Sampling

Sampling for material gradation, liquid limit, and plastic limit tests shall be taken in conformance with ASTM D 75. When deemed necessary, the Contracting Officer will observe the sampling.

1.5.2 Testing

1.5.2.1 Gradation

Aggregate gradation shall be made in conformance with ASTM C 117, ASTM C 136, and ASTM D 422. Sieves shall conform to ASTM E 11.

1.5.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.5.3 Approval of Materials

The source of the material to be used for producing aggregates shall be selected 30 days prior to the time the material will be required in the work. Approval of sources not already approved by the Corps of Engineers will be based on an inspection by the Contracting Officer. Tentative approval of materials will be based on appropriate test results on the aggregate source. Final approval of the materials will

be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted surface course.

1.6 WEATHER LIMITATIONS

Aggregate surface courses shall not be constructed when the ambient temperatures are below 35 degrees F and on subgrades that are frozen or contain frost. It shall be the responsibility of the Contractor to protect, by approved method or methods, all areas of surfacing that have not been accepted by the Contracting Officer. Surfaces damaged by freeze, rainfall, or other weather conditions shall be brought to a satisfactory condition by the Contractor.

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of clean, sound, durable particles of natural gravel, crushed gravel, crushed stone, sand, slag, soil, or other approved materials processed and blended or naturally combined. Aggregates shall be free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign materials. The Contractor shall be responsible for obtaining materials that meet the specification and can be used to meet the grade and smoothness requirements specified herein after all compaction and proof rolling operations have been completed.

2.1.1 Coarse Aggregates

The material retained on the No. 4 sieve shall be known as coarse aggregate. Coarse aggregates shall be reasonably uniform in density and quality. The coarse aggregate shall have a percentage of wear not to exceed 50 percent after 500 revolutions as determined by ASTM C 131. The amount of flat and/or elongated particles shall not exceed 20 percent. A flat particle is one having a ratio of width to thickness greater than three; an elongated particle is one having a ratio of length to width greater than three. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the requirements set forth herein.

2.1.2 Fine Aggregates

The material passing the No. 4 sieve shall be known as fine aggregate. Fine aggregate shall consist of screenings, sand, soil, or other finely divided mineral matter that is processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

Gradation requirements specified in TABLE I shall apply to the completed aggregate surface. It shall be the responsibility of the Contractor to obtain materials that will meet the gradation requirements after mixing, placing, compacting, and other operations. TABLE I shows permissible gradings for granular material used in aggregate surface roads. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION FOR AGGREGATE SURFACE COURSES

Sieve Designation	No. 1	No. 2	No. 3	No. 4
1 in.	100	100	100	100
3/8 in.	50-85	60-100	--	--
No. 4	35-65	50-85	55-100	70-100
No. 10	25-50	40-70	40-100	55-100
No. 40	15-30	24-45	20-50	30-70
No. 200	8-15	8-15	8-15	8-15

2.2 LIQUID LIMIT AND PLASTICITY INDEX REQUIREMENTS

The portion of the completed aggregate surface course passing the No. 40 sieve shall have a maximum liquid limit of 35 and a plasticity index of 4 to 9.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specification requirements in the specified time limit. Upon completion of the work, the aggregate sources on Government property shall be conditioned to drain readily and be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.2 STOCKPILING MATERIALS

Prior to stockpiling the material, the storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled in such a manner that will prevent segregation. Aggregates and binders obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING COURSE

The underlying course, including shoulders, shall be cleaned of all foreign substances. At the time of surface course construction, the underlying course shall contain no frozen material. Ruts or soft yielding spots in the underlying course areas having inadequate compaction and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade and recompact to density requirements specified in Section 02722 AGGREGATE BASE COURSES. The completed underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the surface course is placed.

3.4 GRADE CONTROL

During construction, the lines and grades including crown and cross slope indicated for the aggregate surface course shall be maintained by means of line and grade stakes placed by the Contractor in accordance with the SPECIAL CONTRACT REQUIREMENTS.

3.5 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the material and a uniform optimum water content for compaction. The Contractor shall make adjustments in mixing, placing procedures, or in equipment to obtain the true grades, to minimize segregation and degradation, to obtain the desired water content, and to ensure a satisfactory surface course.

3.6 LAYER THICKNESS

The aggregate material shall be placed on the underlying course in layers of uniform thickness. When a compacted layer of 6 inches or less is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.7 COMPACTION

Each layer of the aggregate surface course shall be compacted with approval compaction equipment. The water content during the compaction procedure shall be maintained at optimum or at the percentage specified by the Contracting Officer. In locations not accessible to the rollers, the mixture shall be compacted with mechanical tampers. Compaction shall continue until each layer through the full depth is compacted to at least ~~100~~95 percent of laboratory maximum density. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked to produce a satisfactory material.

3.8 EDGES OF AGGREGATE-SURFACED ROAD

Approved material shall be placed along the edges of the aggregate surface course in such quantity as to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least 1 foot of shoulder width shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the surface course.

3.9 SMOOTHNESS TEST

The surface of each layer shall not show any deviations in excess of 3/8 inch when tested with a 10 foot straightedge applied both parallel with and at right angles to the centerline of the area to be paved. The Contractor shall correct deviations exceeding this amount by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.10 THICKNESS CONTROL

The completed thickness of the aggregate surface course shall be within 1/2 inch, plus or minus, of the thickness indicated on plans. The thickness of the aggregate surface course shall be measured at intervals in such manner that there will be a thickness measurement for at least each 500 square yards of the aggregate surface course. The thickness measurement shall be made by test holes at least 3 inches in diameter through the aggregate surface course. When the measured thickness of the aggregate surface course is more than 1/2 inch deficient in thickness, the Contractor, at no additional expense to the Government, shall correct such areas by scarifying, adding mixture of proper gradation, reblading, and recompacting, as directed. Where the measured thickness of the aggregate surface course is more than 1/2 inch thicker than that indicated, it shall be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the

job measurements determined as specified above, but shall be within 1/4 inch of the thickness indicated. When the average job thickness fails to meet this criterion, the Contractor shall, at no additional expense to the Government, make corrections by scarifying, adding or removing mixture of proper gradation, and reblading and recompact, as directed.

3.11 DENSITY TESTS

Density shall be measured in the field in accordance with ASTM D 1556.

3.12 WEAR TEST

Wear tests shall be made in conformance with ASTM C 131.

3.13 MAINTENANCE

The aggregate surface course shall be maintained in a condition that will meet all specification requirements until accepted.

END OF SECTION 02731

SECTION 02741 - HOT-MIX ASPHALT (HMA) FOR ROADS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO MP 1	(1998) Provisional Specification for Performance Graded Asphalt Binder
AASHTO MP 2	(1998; Interim 1999) Superpave Volumetric Mix Design
AASHTO TP53	(1998; Interim 1999) Determining Asphalt Content of Hot Mix Asphalt by the Ignition Method

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregates
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	(1995) Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 566	(1997) Evaporable Total Moisture Content of Aggregate by Drying
ASTM C 1252	(1998) Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)
ASTM D 140	(1998) Sampling Bituminous Materials
ASTM D 242	(1995) Mineral Filler for Bituminous Paving Mixtures
ASTM D 1461	(1985)) Moisture or Volatile Distillates in Bituminous Paving Mixtures

ASTM D 1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	(1995) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	(1995) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	(1995) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	(1984; R 1994el) Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	(1996el) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixture
ASTM D 2950	(1997) Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3381	(1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3665	(1999) Random Sampling of Construction Materials
ASTM D 3666	(1998) Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
ASTM D 4125	(1994el) Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867/D 4867M	(1996) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	(1998) Mechanical Size Analysis of Extracted Aggregate
ASTM D 6307	(1998) Asphalt Content of Hot Mix Asphalt by Ignition Method
ASPHALT INSTITUTE (AI)	
AI MS-2	(1997) Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types
AI MS-22	(1998; 2nd Edition) Construction of Hot-Mix Asphalt Pavements

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CDT)

CDT Test 526 (1978) Operation of California Profilograph and Evaluation of Profiles

CORPS OF ENGINEERS (COE)

COE CRD-C 171 (1995) Test Method for Determining Percentage of Crushed Particles in Aggregate

1.2 DESCRIPTION OF WORK

The work shall consist of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design; G

Proposed JMF.

SD-06 Test Reports

Aggregates; G

Aggregate and QC test results.

1.4 HAULING EQUIPMENT

Trucks used for hauling hot-mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

1.5 ASPHALT PAVERS

Asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness,

smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

1.5.1 Receiving Hopper

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

1.5.2 Automatic Grade Controls

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A transverse slope controller shall not be used to control grade. The controls shall be capable of working in conjunction with any of the following attachments:

- a. Ski-type device of not less than 30 feet in length
- b. Taut string line set to grade.
- c. Short ski or shoe for joint matching.
- d. Laser control.

1.6 ROLLERS

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Equipment, which causes excessive crushing of the aggregate, shall not be used.

1.7 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The Contracting Officer may waive the temperature requirements, if requested; however, all other requirements, including compaction, shall be met.

Table 1. Surface Temperature Limitations of Underlying Course

<u>Mat Thickness, inches</u>	<u>Degrees F</u>
3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler. All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. All individual coarse aggregate sources shall meet the following requirements:

- a. The percentage of loss shall not be greater than 40 percent after 500 revolutions when tested in accordance with ASTM C 131.
- b. The percentage of loss shall not be greater than 18 percent after five cycles when tested in accordance with ASTM C 88 using magnesium sulfate.
- c. At least 75 percent by weight of coarse aggregate shall have at least two or more fractured faces when tested in accordance with COE CRD-C 171. Crushing shall produce fractured faces.
- d. The particle shape shall be essentially cubical and the aggregate shall not contain more than 20% percent, by weight, of flat and elongated particles (3:1 ratio of maximum to minimum) when tested in accordance with ASTM D 4791.
- e. Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 75 lb/cu ft when tested in accordance with ASTM C 29/C 29M.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls. All individual fine aggregate sources shall have a sand equivalent value not less than 45 when tested in accordance with ASTM D 2419.

The fine aggregate portion of the blended aggregate shall have an uncompacted void content not less than 43.0 percent when tested in accordance with ASTM C 1252 Method A.

2.1.3 Mineral Filler

Mineral filler added, as well as naturally occurring material in the pre-blended stockpile passing the #200 sieve, shall be nonplastic material meeting the requirements of ASTM D 242.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table 2, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table 2. Aggregate Gradations

<u>Sieve Size, inch</u>	<u>Gradation 1 Percent Passing by Mass</u>	<u>Gradation 2 Percent Passing by Mass</u>	<u>Gradation 3 Percent Passing by Mass</u>
1	100	---	---
3/4	76-96	100	---
1/2	68-88	76-96	100
3/8	60-82	69-89	76-96
No. 4	45-67	53-73	58-78
No. 8	32-54	38-60	40-60
No. 16	22-44	26-48	28-48
No. 30	15-35	18-38	-38
No. 50	9-25	11-27	11-27
No. 100	6-18	6-18	6-18
No. 200	3-6	3-6	3-6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to ASTM D 3381 Table 2, Viscosity Grade AC-10 or AASHTO MP 1 Performance Grade (PG) 58-~~2228~~. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. The Contractor, in accordance with ASTM D 140 and in the presence of the Contracting Officer, shall obtain samples for this verification testing. These samples shall be furnished to the Contracting Officer for the verification testing, which shall be at no cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using procedures contained in AI MS-2 and the criteria shown in Table 3. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D 4867M is less than 75, the aggregates shall be

rejected or the asphalt mixture treated with an approved anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an anti-strip agent is required, the Contractor shall provide it, at no additional cost. Sufficient materials to produce 200 pound of blended mixture shall be provided to the Contracting Officer for verification of mix design at least 14 days prior to construction of test section.

At the option of the contractor a currently used DOT super pave hot mix may be used in lieu of developing a new hot mix design study as described herein. The super pave volumetric mix shall be designed in accordance with AASHTO MP 2.

2.3.1 JMF Requirements

The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

- a. Percent passing each sieve size.
- b. Percent of asphalt cement.
- c. Percent of each aggregate and mineral filler to be used
- d. Asphalt viscosity grade, penetration grade, or performance grade.
- e. Number of blows of hammer per side of molded specimen.
- f. Laboratory mixing temperature.
- g. Lab compaction temperature
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.
- j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-2.
- k. Specific gravity and absorption of each aggregate
- l. Percent natural sand.
- m. Percent particles with 2 or more fractured faces (in coarse aggregate).
- n. Fine aggregate angularity.
- o. Percent flat or elongated particles (in coarse aggregate).
- p. Tensile Strength Ratio (TSR).
- q. Anti-strip agent (if required) and amount.

- r. List of all modifiers and amount.
- s. Percentage and properties (asphalt content, binder properties, and aggregate properties) of reclaimed asphalt pavement (RAP) in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

Table 3. Marshall Design Criteria

<u>Test Property</u>	<u>75 Blow Mix</u>	<u>50 Blow Mix</u>
Stability, pounds minimum	*1800	*1000
Flow, 0.01 inch	8-16	8-18
Air voids, percent	3-5	3-5
Percent Voids in mineral aggregate VMA, (minimum)		
Gradation 1	13.0	13.0
Gradation 2	14.0	14.0
Gradation 3	15.0	15.0
TSR, minimum percent	75	75

* This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

** Calculate VMA in accordance with AI MS-2, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.3.2 Adjustments to Field JMF

The Laboratory JMF for each mixture shall be in effect until the Contracting Officer approves a new formula in writing. Should a change in sources of any materials be made, a new laboratory jmf design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the Laboratory JMF within the limits specified below to optimize mix volumetric properties with the approval of the Contracting Officer. Adjustments to the Laboratory JMF shall be applied to the field (plant) established JMF and limited to those values as shown. Adjustments shall be targeted to produce or nearly produce 4 percent voids total mix (VTM).

TABLE 4. Field (Plant) Established JMF Tolerances

Sieves	Adjustments (plus or minus), percent
No. 4	3
No. 8	3
No. 200	1
Binder Content	0.40

If adjustments are needed that exceed these limits, a new mix design shall be developed. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; while not desirable, this is acceptable.

2.4 RECYCLED HOT MIX ASPHALT

Recycled HMA shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt cement. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 2 inches. The recycled HMA mix shall be designed using procedures contained in AI MS-2 and AI MS-22. The job mix shall meet the requirements of paragraph MIX DESIGN. The amount of RAP shall not exceed 30 percent.

2.4.1 RAP Aggregates and Asphalt Cement

The blend of aggregates used in the recycled mix shall meet the requirements of paragraph AGGREGATES. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D 2172 using the appropriate dust correction procedure.

2.4.2 RAP Mix

The blend of new asphalt cement and the RAP asphalt binder shall meet the viscosity or dynamic shear rheometer at high temperature and bending beam at low temperature requirements in paragraph ASPHALT CEMENT BINDER. The virgin asphalt cement shall not be more than two standard asphalt material grades different than that specified in paragraph ASPHALT CEMENT BINDER.

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates. Modified asphalts shall be no more than 350 degrees F when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be heated and dried prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. A prime coat and/or tack coat shall be applied in accordance with the contract specifications.

3.5 TEST SECTION

Prior to full production, the Contractor shall place a test section for each JMF used. The contractor shall construct a test section ~~250-500~~ 8 feet wide by 50 feet long and two-paver passes wide placed for two lanes, with a longitudinal cold joint. The test section shall be of the same depth as the course, which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment and personnel used in construction of the test section shall be the same equipment to be used on the remainder of the course represented by the test section. The test section shall be placed as part of the project pavement as approved by the Contracting Officer.

3.5.1 Sampling and Testing for Test Section

One random sample shall be taken at the plant, triplicate specimens compacted, and tested for stability, flow, and laboratory air voids. A portion of the same sample shall be tested for aggregate gradation and asphalt content. Four randomly selected cores shall be taken from the finished pavement mat, and four from the longitudinal joint, and tested for density. Random sampling shall be in accordance with procedures contained in ASTM D 3665. The test results shall be within the tolerances shown in Table 5 for work to continue. If all test results meet the specified requirements, the test section shall remain as part of the project pavement. If test results exceed the tolerances shown, the test section shall be removed and replaced at no cost to the Government and another test section shall be constructed. The test section shall be paid for with the first lot of paving

Table 5. Test Section Requirements for Material and Mixture Properties

<u>Property</u>	<u>Specification Limit</u>
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0
VMA, Percent (Average of 3 specimens)	13 minimum
Stability, pounds (Average of 3 specimens)	1000 minimum
Flow, 0.01 inches (Average of 3 specimens)	8 - 18
Mat Density, Percent of Marshall (Average of 4 Random Cores)	97.0 - 100.5
Joint Density, Percent of Marshall (Average of 4 Random Cores)	95.5 - 100.5

3.5.2 Additional Test Sections

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

3.6 TESTING LABORATORY

The laboratory used to develop the JMF shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

- Qualifications of personnel; laboratory manager, supervising technician, and testing technicians
- A listing of equipment to be used in developing the job mix
- A copy of the laboratory's quality control system.

- d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.7 TRANSPORTING AND PLACING

3.7.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, the Contractor shall use a material transfer vehicle, which shall be operated to produce continuous forward motion of the paver.

3.7.2 Placing

The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.8 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.9 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.9.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing material at the joint. The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.9.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing adjacent lanes), or otherwise defective, shall be cut back a minimum of 2 inches from the edge with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

3.10 CONTRACTOR QUALITY CONTROL

3.10.1 General Quality Control Requirements

The Contractor shall develop an approved Quality Control Plan. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements, which affect the quality of the pavement including, but not limited to:

- a. Mix Design
- b. Aggregate Grading
- c. Quality of Materials
- d. Stockpile Management
- e. Proportioning
- f. Mixing and Transportation
- g. Mixture Volumetrics
- h. Moisture Content of Mixtures
- i. Placing and Finishing

- j. Joints
- k. Compaction
- l. Surface Smoothness

3.10.2 Testing Laboratory

The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site. The laboratory shall meet the requirements as required in ASTM D 3666. The effective working area of the laboratory shall be a minimum of 150 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 75 degrees F plus or minus 5 degrees F. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Contracting Officer shall be permitted unrestricted access to inspect the Contractor's laboratory facility, to witness quality control activities, and to perform any check testing desired. The Contracting Officer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to adversely affect test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are corrected.

3.10.3 Quality Control Testing

The Contractor shall perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability, flow, in-place density, grade and smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

3.10.3.1 Asphalt Content

A minimum of two tests to determine asphalt content will be performed per lot (a lot is defined in paragraph MATERIAL ACCEPTANCE AND PERCENT PAYMENT) by one of the following methods: the extraction method in accordance with ASTM D 2172, Method A or B, the ignition method in accordance with the AASHTO TP53 or ASTM D 6307 or the nuclear method in accordance with ASTM D 4125, provided the nuclear gauge is calibrated for the specific mix being used. For the extraction method, the weight of ash, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.10.3.2 Gradation

Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of recovered aggregate in accordance with ASTM D 5444. When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix plants. For batch plants, aggregates shall be tested in accordance with ASTM C 136 using actual batch weights to determine the combined aggregate gradation of the mixture.

3.10.3.3 Temperatures

Temperatures shall be checked at least four times per lot, at necessary locations, to determine the temperature at the dryer, the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.10.3.4 Aggregate Moisture

The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

3.10.3.5 Moisture Content of Mixture

The moisture content of the mixture shall be determined at least once per lot in accordance with ASTM D 1461 or an approved alternate procedure.

3.10.3.6 Laboratory Air Voids, Marshall Stability and Flow

Mixture samples shall be taken at least four times per lot and compacted into specimens, using 50 blows per side with the Marshall hammer as described in ASTM D 1559. After compaction, the laboratory air voids of each specimen shall be determined, as well as the Marshall stability and flow.

3.10.3.7 In-Place Density

The Contractor shall conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D 2950.

3.10.3.8 Additional Testing

Any additional testing, which the Contractor deems necessary to control the process, may be performed at the Contractor's option.

3.10.3.9 QC Monitoring

The Contractor shall submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.10.4 Sampling

When directed by the Contracting Officer, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.10.5 Control Charts

For process control, the Contractor shall establish and maintain linear control charts on both individual samples and the running average of last four samples for the parameters listed in Table 6, as a minimum. These control charts shall be posted as directed by the Contracting Officer and shall be kept current at all times. The control charts shall identify the project number, the test parameter being

plotted, the individual sample numbers, the Action and Suspension Limits listed in Table 6 applicable to the test parameter being plotted, and the Contractor's test results. Target values from the JMF shall also be shown on the control charts as indicators of central tendency for the cumulative percent passing, asphalt content, and laboratory air voids parameters. When the test results exceed either applicable Action Limit, the Contractor shall take immediate steps to bring the process back in control. When the test results exceed either applicable Suspension Limit, the Contractor shall halt production until the problem is solved. The Contractor shall use the control charts as part of the process control system for identifying trends so potential problems can be corrected before they occur. Decisions concerning mix modifications shall be made based on analysis of the results provided in the control charts. The Quality Control Plan shall indicate the appropriate action, which shall be taken to bring the process into control when certain parameters exceed their Action Limits.

Table 6. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts

<u>Parameter to be Plotted</u>	<u>Running Average of Individual Samples</u>		<u>Last Four Samples</u>	
	<u>Action Limit</u>	<u>Suspension Limit</u>	<u>Action Limit</u>	<u>Suspension Limit</u>
No. 4 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative % Passing, deviation from JMF target; plus or minus values	1.4	2.0	1.1	1.5
Stability, pounds (minimum)				
75 Blow JMF	1800	1700	1900	1800
50 Blow JMF	1000	900	1100	1000
Flow, 0.01 inches				
75 Blow	8 min. 16 max.	7 min. 17 max.	9 min. 15 max.	8 min. 16 max.
50 Blow	8 min. 18 max.	7 min. 19 max.	9 min. 17 max.	8 min. 18 max.
Asphalt content, % deviation from JMF target; plus or minus value	0.4	0.5	0.2	0.3
Laboratory Air Voids, % deviation from JMF target value	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Mat Density, % of Marshall density	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Joint Density, % of Marshall density	No specific action and suspension limits set since this parameter is used to determine percent payment			

3.11 MATERIAL ACCEPTANCE AND PERCENT PAYMENT

An independent laboratory, hired by the Contractor, will perform testing for acceptability of work. Test results and payment calculations shall be forwarded daily to the Contracting Officer. Acceptance of the plant produced mix and in-place requirements will be on a lot to lot basis. A standard lot for all requirements will be equal to 2000 tons. Where appropriate, adjustment in payment for individual lots of hot-mix asphalt will be made based on in-place density, laboratory air voids, grade and smoothness in accordance with the following paragraphs. Grade and surface smoothness determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus grade and smoothness measurements for the entire lot cannot be made. In order to evaluate laboratory air voids and in-place (field) density, each lot will be divided into four equal sublots.

3.11.1 Sublot Sampling

One random mixture sample for determining laboratory air voids, theoretical maximum density, and for any additional testing the Contracting Officer desires, will be taken from a loaded truck delivering mixture to each sublot, or other appropriate location for each sublot. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to ASTM D 3665 and employing tables of random numbers or computer programs. Laboratory air voids will be determined from three laboratory compacted specimens of each sublot sample in accordance with ASTM D 1559. The specimens will be compacted within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Samples will not be reheated prior to compaction and insulated containers will be used as necessary to maintain the temperature.

3.11.2 Additional Sampling and Testing

The Contracting Officer reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The Government will pay for the cost of any additional testing. Testing in these areas will be in addition to the lot testing, and the requirements for these areas will be the same as those for a lot.

3.11.3 Laboratory Air Voids

Laboratory air voids will be calculated by determining the Marshall density of each lab compacted specimen using ASTM D 2726 and determining the theoretical maximum density of every other sublot sample using ASTM D 2041. Laboratory air void calculations for each sublot will use the latest theoretical maximum density values obtained, either for that sublot or the previous sublot. The mean absolute deviation of the four laboratory air void contents (one from each sublot) from the JMF air void content will be evaluated and a pay factor determined from Table 7. All laboratory air void tests will be completed and reported within 24 hours after completion of construction of each lot.

3.11.4 In-place Density

3.11.4.1 General Density Requirements

For determining in-place density, one random core will be taken by the Government from the mat (interior of the lane) of each sublot, and one random core will be taken from the joint (immediately over joint) of each sublot. Each random core will be full thickness of the layer being placed. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, another

random core will be taken. After air drying to a constant weight, cores obtained from the mat and from the joints will be used for in-place density determination.

3.11.5 Grade

The final wearing surface of pavement shall conform to the elevations and cross sections shown and shall vary not more than 0.05 foot from the plan grade established and approved at site of work. Finished surfaces at juncture with other pavements shall coincide with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. The final wearing surface of the pavement will be tested for conformance with specified plan grade requirements. The grade will be determined by running lines of levels at intervals of 25 feet, or less, longitudinally and transversely, to determine the elevation of the completed pavement surface. Within 5 working days, after the completion of a particular lot incorporating the final wearing surface, the Contracting Officer will inform the Contractor in writing, of the results of the grade-conformance tests. When more than 5 percent of all measurements made within a lot are outside the 0.05-foot tolerance, the pay factor based on grade for that lot will be 95 percent. In areas where the grade exceeds the tolerance by more than 50 percent, the Contractor shall remove the surface lift full depth; the Contractor shall then replace the lift with hot-mix asphalt to meet specification requirements, at no additional cost to the Government. Diamond grinding may be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted.

3.11.6 Surface Smoothness

All testing shall be performed in the presence of the Contracting Officer. Detailed notes of the results of the testing shall be kept and a copy furnished to the Government immediately after each day's testing. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Contracting Officer.

3.11.6.1 Smoothness Requirements

a. Straightedge Testing: The finished surfaces of the pavements shall have no abrupt change of 1/4 inch or more, and all pavements shall be within the tolerances specified in Table 9 when checked with an approved 12 foot straightedge.

Table 9. Straightedge Surface Smoothness—Pavements

Pavement Category	Direction of Testing	Tolerance, inches
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All	Longitudinal	1/4
paved areas	Transverse	1/4

3.11.6.2 Testing Method

After the final rolling, but not later than 24 hours after placement, the surface of the pavement in each entire lot shall be tested by the Contractor in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. Separate testing of individual sublots is not required. If any pavement areas are ground, these areas shall be retested immediately after grinding. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines. The transverse lines shall be 25 feet or less apart, as directed. The longitudinal lines shall be at the centerline of each paving lane for lines less than 20 feet and at the third points for lanes 20 feet or greater. Other areas having obvious deviations shall also be tested. Longitudinal testing lines shall be continuous across all joints.

- a. Straightedge Testing. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

END OF SECTION 02741